

# PATENT SPECIFICATION

908,097

DRAWINGS ATTACHED.



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## COMPLETE SPECIFICATION.

### Improvements in or relating to Toy Building Sets and Associated Building Elements.

I, GODTFRED KIRK CHRISTIANSEN, of c/o A/S Lego System, Billund, Denmark, of Danish nationality, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement: —

This invention relates to a toy building set of the kind in which the individual building elements consist of hollow blocks provided with assembly studs protruding from their outer surface.

The assembly studs serve to connect the individual elements during their assembly into various building constructions the studs protruding from the outer surface, herein after called primary studs, being inserted in the hollow space of the adjacent element and attached to this by the squeezing effect between the studs of one element and the inner walls of the adjacent elements.

It is known that the squeezing effect may be increased and a very large number of different assembly possibilities may be obtained by providing the elements with further assembly studs, hereinafter called secondary studs, inside the hollow space of the element and positioned in a way which has been described in detail in the Specification of British Patent No. 866,557 (Application No. 1016/59).

Such elements which are normally manufactured by hot pressing or moulding of plastics such as cellulose acetate are particularly suited to provide a large number of possibilities in combining the individual elements in a large number of different positions in relation to one another and attaching them to each other by means

of the squeezing effect between the primary studs and the secondary studs in order to build up an assembly.

The elements may be assembled by building upwards or sideways but in order to build out sideways it is a condition that the assembly is simultaneously built upwards.

It is the general object of the present invention to provide a building set which has not got this limitation and thus allows the elements to be joined in a sideways direction without simultaneous build-up of the height of the construction and consequently providing a still larger number of combination possibilities.

To achieve this it is a necessary condition that also the side surfaces of the elements are provided with corresponding assembly members in the form of studs but it has been shown that this, otherwise simple provision, is not sufficient to meet the demands which in actual fact must be made on such building elements. Additionally there is the further requirement of a quite definite dimensioning of the building element so that both the known primary studs and the additional assembly studs hereinafter called side studs which must be provided to assembly two building elements side by side, will have a precisely defined dimensional ratio both mutually and in relation to the height and wall thickness of the building elements.

It is accordingly a further object of the present invention to indicate such mutual relationship between the height of the elements and the location of the assembly studs that the desired additional possibilities of assembly are achieved and so that the highest possible number of variations in building constructions may be achieved with

the least possible number of standard types of elements.

The present invention consists in a building set of the kind described, in which each of the elements has a height of unit  $m$  and a width and length which is a multiple of  $m$  and that one or more sides of some of the said elements is or are provided with an assembly stud or studs the axis of each of which intersects at right angles to the axis of any assembly stud of the one outer surface of the element.

The invention further consists in an element of such a building set having a square outer surface with sides  $2m$  and four cylindrical assembly studs wherein at least one side surface has two assembly studs identical to the assembly studs of the outer surface are provided along the longer centre line of at least one of the side surfaces.

A number of variants of such building elements and their possible application will now be described by way of example with reference to the accompanying drawing in which:—

Figure 1 shows a building element according to the invention seen in perspective; and

Figure 2 is a plan view of Figure 1;

Figures 3 to 14 show in plan view a number of variants of the building elements of Figures 1 and 2;

Figure 15 shows in plan view a building construction produced by the assembly of the elements shown in Figure 12;

Figure 16 shows one example of the application of building elements in the building of a construction in which the assembly studs are turned in opposite directions;

Figure 17 shows a perspective view of a cubic building element;

Figure 18 shows in perspective view the application of building elements according to the invention to produce a building construction which has been built out in a side-ways direction.

The building elements shown in Figures 1 to 14 and which collectively may be designated as the main type of elements for a building set according to the invention, all have a height of unit  $m$  while their width and length are  $2m$ . Some of the elements, those shown in Figures 1, 2, 3, 4, 5, 6, 11, 12, 13, and 14, are provided with assembly studs 2 on one or more of their side surfaces  $b$ . The axis  $y$  of each of the assembly studs 2 is at right angles to the axis  $x$  of each of the so called primary assembly studs 1 positioned externally on the top outer surface  $a$  of the elements.

Additionally, some of the elements, those of Figures 1, 2, 7, 8, 9, 10, 11, 12, 13 and 14, are provided with holes 3 in at least one of the side surfaces  $b$  and such holes 3 correspond to the side studs 2 in such a way that the elements may be assembled side by side

by the insertion of the side studs 2 into the side holes 3.

Preferably the side studs 2 and the side holes 3 are provided in pairs on the side surfaces  $b$  as shown in Figure 1 to 13 a building element may be provided with only one side stud 2 and one hole 3 on one or more side surfaces as shown in Figure 14.

In Figure 1 the side holes 3 are positioned in one side surface  $b$  which is at right angles to the side surface which is provided with the side studs 2 and the axis  $z$  of a hole 3 intersects at right angles the axis  $y$  of a side stud 2.

As shown in Figure 15 the elements shown in Figure 1 to 14 may be used for example to produce long flat building constructions in shapes similar to boards or beams and such constructions may be produced in half width by the use of the cubic building elements with side studs 2 shown in Figure 17.

A particularly important application of the building elements has been shown in Figure 16. By using elements with a square bottom surface having sides  $2m$  and side studs 2 two elements may be assembled with their open side surfaces facing each other since the elements may be coupled by means of the top and bottom elements which are locked to the two former elements by means of the side studs 2. This produces an assembled unit with side studs 1 facing in opposite directions and the construction may accordingly be extended in both directions by means of corresponding elements or by using previously known standard elements not provided with side studs.

As shown in Figure 1, 2 and 18 the elements according to the invention may in known manner be provided with internal studs 4, so called secondary studs, so positioned in relation to the primary studs 1 that the circular cross section of the tubular secondary studs 4 touches the circular cross section of the primary studs 1 as shown in Figure 2.

The wall thickness of the elements shown in Figures 1 to 18 is given the designation  $w$  (Figure 2) and the assembly studs 1 and 2 are cylindrical with the diameter  $m-2w$  as far as the embodiments shown in the drawing are concerned. In principal however, the assembly studs 1 and 2 may equally well have a different cross sectional shape, for example a square with rounded corners.

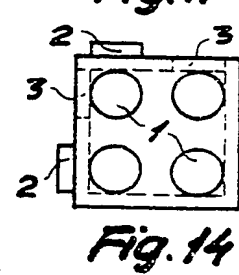
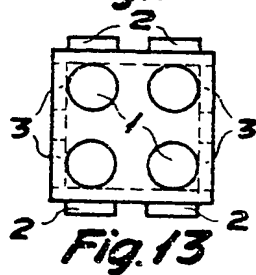
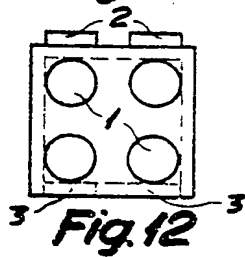
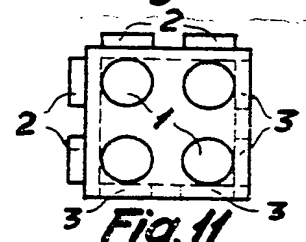
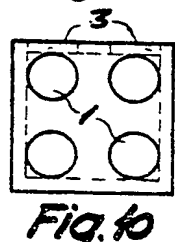
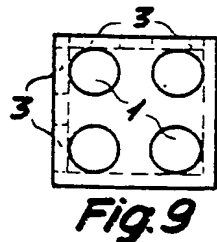
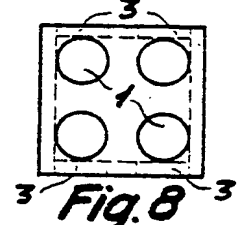
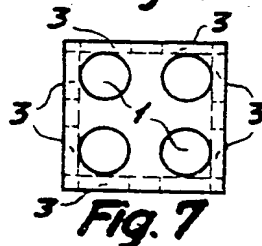
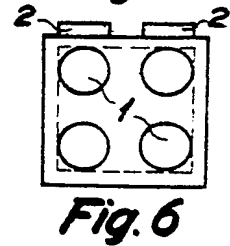
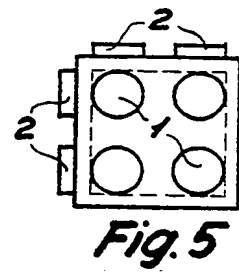
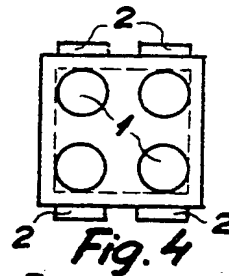
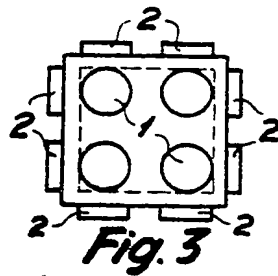
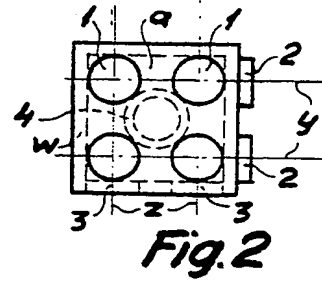
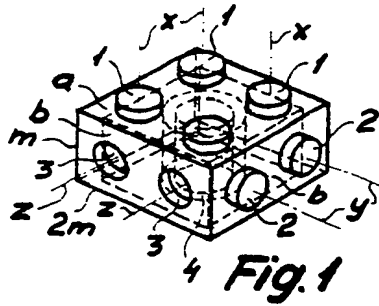
#### WHAT I CLAIM IS:—

1. A toy building set comprising building elements in the form of hollow blocks each of which has assembly studs on one outer surface, wherein each one of the said elements has a height of unit  $m$  and a width and length which is a multiple of  $m$  and that one or more sides of some of the said

- elements is or are provided with an assembly stud or studs the axis of each of which intersects at right angles the axis of any assembly stud of the one outer surface of the element.
- 5 2. A building element for a building set as claimed in Claim 1 having a square outer surface with sides  $2m$  and four cylindrical assembly studs wherein the assembly studs are identical to those of the one outer surface 10 are provided along the longer centre line of at least one of the side surfaces.
3. A building element as claimed in Claim 2, wherein two joining side surfaces are each provided with two side studs.
- 15 4. A building element as claimed in Claim 3, wherein the two other side surfaces have cylindrical holes of the same diameter as the side studs.
- 20 5. A building element for building set as claimed in Claim 2 wherein at least one of the side surfaces is provided with two cylindrical holes of the same diameter as the assembly studs of the one outer surface and positioned on the centre line of the side surfaces.
- 25 6. A building set as claimed in Claim 1, wherein some of the elements are cubic in shape having sides  $m$  and that at least one of the side surfaces is provided with a cylindrical assembly stud of diameter  $m-2w$  30 where  $w$  is the wall-thickness of the element.
7. A toy building set substantially as hereinbefore described and shown by the accompanying drawings.
8. A building element for a toy building 35 set substantially as hereinbefore described and shown by the accompanying drawings.

## MARKS &amp; CLERK.

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2 SHEETS

COMPLETE SPECIFICATION  
This drawing is a reproduction of  
the Original on a reduced scale.  
SHEETS 1 & 2

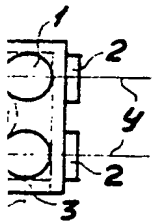


Fig. 2



Fig. 5

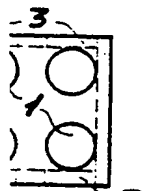


Fig. 8

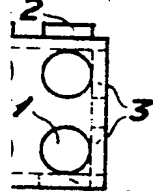


Fig. 11

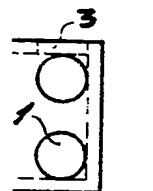


Fig. 14

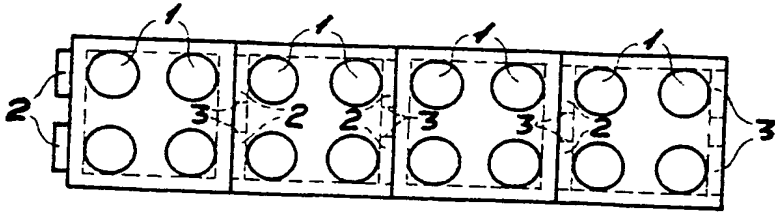


Fig. 15

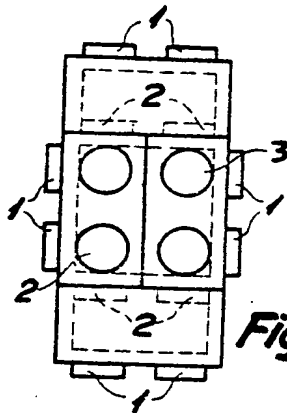


Fig. 16

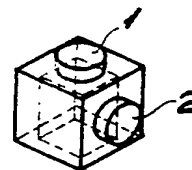


Fig. 17

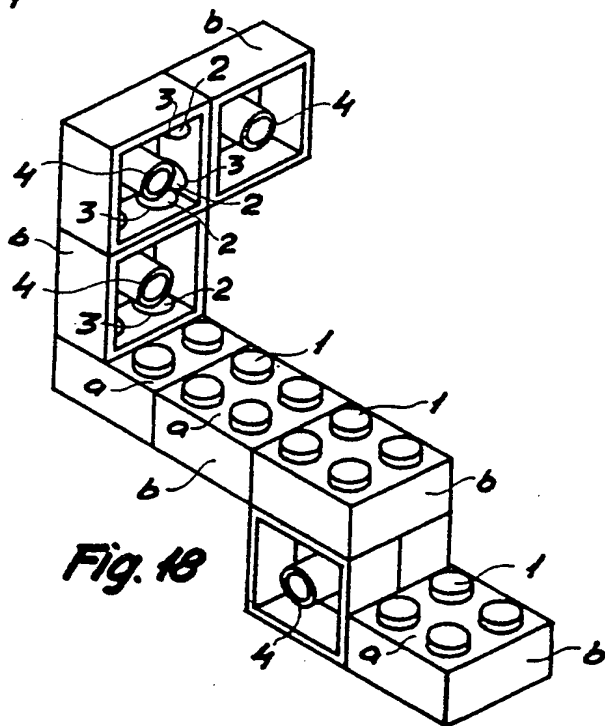


Fig. 18

